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ABSTRACT

A study was conducted to examine longitudinal and cross-sectional age effects on accuracy of decoding nonverbal cues. A videotaped nonverbal discrepancy test was administered to 78 children aged nine to fifteen years. The test measured (1) decoding accuracy--the extent to which subjects were able to identify affects (positivity and dominance) from visual (facial and body) cues and audio (content filtered and random spliced) cues; (2) discrepancy accuracy--the extent to which subjects recognized the degree of discrepancy between audio and video cues; and (3) video primacy--the extent to which subjects were more influenced by video than by audio cues. It was found that older children benefited more than younger ones from the effects of retesting in their accuracy at decoding discrepant cues; that older relative to younger children displayed a trend for less video primacy after retesting; and that relative to younger children, older children showed less video primacy in decoding extremely discrepant audio and video nonverbal cues. The findings suggest that although older children perform most nonverbal decoding tasks better than younger children, the advantages of age are especially great for the decoding of the more discrepant channels. (Author/FL)

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Longitudinal and Cross-sectional Age Effects in Nonverbal Decoding Skill and Style

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Abstract

This study examined longitudinal and cross-sectional age effects on accuracy of decoding nonverbal cues. A videotaped Nonverbal Discrepancy Test was administered to children aged 9 to 15 years. The discrepancy test measures (a) decoding accuracy- the extent to which subjects are able to identify affects (positivity and dominance) from visual (facial and body) cues and audio (content filtered and random spliced) cues, (b) discrepancy accuracy- the extent to which subjects recognize the degree of discrepancy between audio and video cues, and (c) video primacy- the extent to which subjects are more influenced by video (face or body) than by audio cues. It was found that (1) older children benefited more than younger ones from the effects of retesting in their accuracy at decoding discrepant cues, (2) older relative to younger children displayed a trend for less video primacy after retesting, and (3) relative to younger children, older children showed less video primacy in decoding extremely discrepant ("leaky"), as compared to slightly discrepant, audio and video nonverbal cues. Thus, although older children perform better than younger children at most nonverbal decoding tasks, the advantages of age are especially great for the decoding of the more discrepant or leakier channels. The processes which may underlie increases in specific nonverbal skills and changes in nonverbal styles were discussed.

A great deal of research has been directed toward studying the development of nonverbal skills in children (DePaulo & Rosenthal, 1978; Dimitrovsky, 1964; Gates, 1923; Girgus & Wolf, 1975; McCluskey, Albas, Niemi, Cueras, & Ferrer, 1975; Rosenthal, Hall, DiMatteo, Rogers, & Archer, 1979; Zuckerman, Blanck, DePaulo, & Rosenthal, 1980; Blanck, Rosenthal, Snodgrass, DePaulo, & Zuckerman, Note 1). Several studies have explored the relationships among different kinds of nonverbal communication skills in children (Buck, 1975; DePaulo & Rosenthal, 1979a; DePaulo, Rosenthal, Finkelstein, & Eisenstat, 1979; Zuckerman & Przewuzman, 1979). A few studies have examined socialization, friendship, family, and/or cognitive variables which may facilitate or inhibit the development of particular nonverbal styles and skills in children (Blanck, Zuckerman, DePaulo, & Rosenthal, 1980; Blanck, Johnson, Rosenthal, Snodgrass, & DePaulo, Note 2; Blanck & Rosenthal, Note 3; Green & Santostefano, Note 4).

The research on developmental changes in nonverbal decoding has employed cross-sectional methods almost exclusively. Many developmentalists might consider this independent-measurement method to yield only approximate conclusions about development (Baltes, Reese, & Nesselroade, 1977). The longitudinal method, on the other hand, might more accurately describe intraindividual change in the development of nonverbal communication. Of course, each method has it's strengths and weaknesses. One problem with the longitudinal method is the difficulty of disentangling the effects of practice, retesting, and maturation.

The present investigation examined both longitudinal and cross-sectional age effects on accuracy of decoding nonverbal cues.

Three different nonverbal variables were examined: (1) decoding accuracy, or subjects' ability to identify the degree of positivity and dominance in face, body, and tone of voice cues; (2) discrepancy accuracy, or subjects' ability to recognize the degree of discrepancy between audio and video cues; and (3) video primacy, or the extent to which subjects weigh video information (from the face or body) more heavily than audio information when video and audio cues conflict (DePaulo, Rosenthal, Eisenstat, Rogers, & Finkelstein, 1978). Decoding accuracy and discrepancy accuracy tend to be fairly independent skills (DePaulo & Rosenthal, 1979c), while primacy is more accurately described as a style, strategy, preference, or bias, rather than a skill.

DePaulo and Rosenthal (1978, 1979a, in press) have suggested that the increasing efficiency with age in the utilization of information in nonverbal decoding tasks might be attributable to a growing information processing capacity, and that this increase might be moderated by the amount or type of information that is available. Indeed, Case (1972), and Pascual-Leone (1970), have suggested that information processing capacity increases with age and can account for the growth of many cognitive-developmental skills.

Employing a cross-sectional sample and utilizing consistent nonverbal cues, DePaulo and Rosenthal (1978) have shown that increases in nonverbal accuracy with increasing amounts of information were more pronounced for older than younger children. The results of this study suggested that nonverbal processing capacity may vary with age, or alternatively, that older children may put more effort into such experimental tasks, have a lower distractability level, and/or simply greater stamina.

In the present study, it was predicted that although older children would be expected to perform better than younger children at most nonverbal tasks (i.e., the decoding of consistent nonverbal cues), older children would be expected to be even more effective than younger children at organizing and interpreting discrepant nonverbal cues which involve making sense of complicated mixed channel messages. Further, it was thought that, retesting might be associated with greater gains in decoding discrepant nonverbal cues for older relative to younger children.

Our second interest was in the development of video primacy. There is evidence which suggests that video (but not audio) cues have less impact on young children (relative to adults) (Bugental, Kaswan, Love, & Fox, 1970; Rosenthal et al., 1979; Zuckerman et al., 1980). That is, older children may favor the information they gain from video cues over the information they gain from audio cues. Further, DePaulo et al., (1978) have found that adults are more influenced by video cues--particularly facial cues--than by audio cues, and the face has been shown to be the most informative channel (Ekman & Friesen, 1969; Izard, 1971; Rosenthal et al., 1979). Perhaps, younger children, relative to older children, are less able to process some of the information that the face has to offer and less able to profit from the effects of retesting.

Accordingly, this study also examined the developmental aspects of video primacy (longitudinally and cross-sectionally). It was predicted that older children would show less video primacy after retesting than younger children perhaps because older children have learned through socialization and/or from experience that as nonverbal

cues become discrepant, one is able to gain more information about an encoder's true affect by relying more heavily on less controllable channels (i.e., tone).

Our final interest was in the extent to which this video primacy was influenced by the degree of discrepancy between audio and video nonverbal cues (leakage). The findings reported by Rosenthal et al., (1979), were based on the study of consistently-communicated video and audio cues, and those of Zuckerman et al., (1980) were based on both consistent and discrepant cues. Both studies employed cross-sectional designs. In real life, the audio and video channels often operate simultaneously, but their messages are not always consistent. Feelings of ambivalence, attempts at deception, and expressions of sarcasm may all lead the sender to express different emotions in different channels. The possibility of discrepancy among channels raises the question of which cues or channels the decoders "trust" more or weigh more heavily in their judgments (i.e., the more leaky or less leaky channels). This question is addressed in the present study from a longitudinal and cross-sectional perspective; that is, we examined childrens' nonverbal leakage decoding strategy at different ages.

DePaulo et al., (1979) speculated that people tend to perceive extremely discrepant messages as indicative of deception and consequently weight more heavily the less controllable vocal cues. When communication is considered deceptive, a less controllable channel such as the voice is more likely to leak information about the sender's true affect than more controllable channels such as the face (cf. Ekman & Friesen, 1969). Thus, as nonverbal cues become more and more discrepant ("leakier"),

older children might also show a decrease in video primacy, relative to younger children. Perhaps, older children have learned through socialization to develop some degree of distrust toward facial expressions when the expressions are accompanied by discrepant vocal cues.

Method

Subjects and Experimenter

The study was conducted in a summer camp during the summers of 1978 and 1979. Subjects were 78 children (54 males and 24 females) between the ages of 9 and 15 in 1978. There were no campers older than 15 and pretesting established that children younger than 9 began to manifest some difficulty in understanding the experimental task. The participants came from homogeneous backgrounds, mostly middle- and upper-middle-class families.[1]

The experimenter, a male, worked as a counselor and group leader at the camp and thus was a familiar figure to all participants.

Materials

Sensitivity to discrepant audio and video cues was measured by the Nonverbal Discrepancy Test (DePaulo et al., 1978). The items for the test were developed from 2-sec videotaped and audiotaped enactments of eight everyday life situations by a 24 year-old woman. The eight situations are categorized into four different types, each formed by the crossing of two dimensions: positive-negative and dominant-submissive. Thus, there are two positive-dominant situations (admiring nature and talking to a lost child), two positive-submissive situations (expressing gratitude and expressing deep affection), two negative-dominant situations

(criticizing someone for being late and expressing jealous rage), and two negative-submissive situations (talking about the death of a friend and asking forgiveness). The categorization of the situations into the four types or quadrants was determined by ratings of two independent samples of judges (Rosenthal et al., 1979).

The enactments of the eight situations were recorded in four channels. Two channels were video channels, showing only the body (neck to knees) or only the face; two others were audio channels: content filtered (Rogers, Scherer & Rosenthal, 1971) and randomized spliced (Scherer, 1971). Content filtering removes from the voice the high frequencies upon which word recognition depends. Randomized splicing is a technique whereby the audiotape is cut into pieces which are then spliced together in a random order. Either process renders the speech unintelligible but whereas content filtering preserves sequences and rhythm, randomized splicing saves pitch and intensity.

In the discrepancy test each facial enactment of the eight situations is paired with four content filtered voices (one from each quadrant) and four randomized spliced voices (one from each quadrant), thus resulting in 64 (8 x 8) face plus audio items. The eight body enactments are paired with the audio enactments in a similar way, thus resulting in another 64 items, and creating a 128-item test. For one quarter of the items, the video (face or body) and the audio (content filtered or randomized spliced) cues are from the same quadrant; for example, a positive-dominant face might be paired with a positive-dominant voice. One quarter of the items consist of video and audio cues from exactly opposite quadrants; for example, a positive-dominant face might

be paired with a negative-submissive voice. The video and audio components of the remaining items differ on only one of the affective dimensions; for example, a positive-dominant face might be paired with either a positive-submissive voice or a negative-dominant voice. In sum, one quarter of the items are consistent whereas three quarters are either entirely or partially inconsistent. (For a more detailed description of the Nonverbal Discrepancy Test, see DePaulo et al., 1978).

Instructions

The discrepancy test was administered in group sessions with number of subjects per session ranging from 15 to 25 (median = 18). The experimenter explained to the subjects that they were going to see a series of film clips showing a face or a body accompanied by a voice. The subjects were told that sometimes they would get very similar impressions from the voice and from the face or body, but that other times the impressions from the voice and from the face or body would be different. For each scene, subjects were required to indicate their overall impression based on both the voice and the face or body. Specifically, they judged each scene on two dimensions (positive-negative and dominant-submissive) and also indicated the extent to which the audio and video components were discrepant. To facilitate the judgment task, we utilized 9-point rating scales with endpoint labels that were familiar to children: sad (1) - happy (9) for the positive-negative dimension, weak (1) - bossy (9) for the dominant-submissive dimension, and not different (1) - different (9) for ratings of discrepancy.

Care was exercised to ascertain that the subjects, particularly the younger children, understood the experimental task. Thus, the

experimenter repeated the instructions twice or more, gave examples of consistent and discrepant messages, and answered all questions. Although it took more time to explain the instructions to the younger children, all children in the study semed to understand the procedure.

Dependent Variables and Data Analysis

Subjects' ratings of the scenes in the discrepancy test yield video primacy scores and accuracy scores. Video primacy scores reflect the extent to which subjects were more influenced by video than by audio cues. A subject who is more influenced by the video channel would rate more positively (a) scenes in which the video cues were positive and the audio cues were negative than (b) scenes in which the audio scenes were positive and the video cues were negative. Thus, video primacy scores for positivity ratings were computed by subtracting the mean of a subject's positivity ratings of all audio-positive/video-negative scenes from the mean of his or her positivity ratings of all video-positive/audio-negative scenes. These primacy scores were computed separately for scenes in which the video cue was a face and for scenes in which the video cue was a body. The video primacy scores for ratings of dominance were computed in a similar way. Thus, there were video primacy scores for each combination of Channel (face/body) X Dimension (positivity/dominance) as well as marginal totals for channels and dimensions, and a total score. Higher primacy scores reflect more influence by video than by audio cues.

There were two types of accuracy scores, accuracy of decoding affect and accuracy of decoding discrepancy. People who are accurate at decoding affect should rate the positive scenes as more positive than the

negative scenes and the dominant scenes as more dominant than the submissive scenes. Hence, accuracy for positivity ratings was defined as the difference between subjects' mean positivity ratings of the positive scenes and their mean ratings of the negative scenes.[2] Accuracy scores for dominance ratings were computed analogously. Both positivity and dominance accuracy scores were computed for the consistent items only and therefore were completely independent of the video primacy scores. All consistent items in the discrepancy test have an audio component that was paired either with the body or with the face. Thus, there were accuracy scores for each combination of Channel (face + voice/body + voice) X Dimension (positivity/dominance) as well as marginal totals for channels and dimensions, and a total score. Higher scores reflect higher accuracy at decoding affects. It should be noted that for both video primacy and accuracy at decoding affect, the expected value under the null hypothesis of no primacy and/or no accuracy is zero and individual differences in the use of rating scales (e.g., tendency to rate scenes as extremely positive or as extremely negative) have no effect on this expected value.

Accuracy of decoding discrepancy (leakage decoding strategy) reflects subjects' ability to recognize the degree of discrepancy between audio and visual cues. Accurate judges of discrepancy should rate as more discrepant the scenes that are actually more discrepant. Thus, this type of accuracy was computed from subjects' discrepancy ratings (1 = not different, 9 = different) according to the following formula: (mean of discrepancy ratings of the very discrepant scenes x 2) + (mean of discrepancy ratings of the slightly discrepant scenes) - (mean of the ratings of the nondiscrepant scenes x 3). Higher scores reflect a higher

accuracy at decoding discrepancy. In this formula, as in the other accuracy formulas, the expected value under the null hypothesis of no accuracy is zero.

Video primacy and accuracy at decoding affect were examined in unweighted means analyses of variance in which age (9 to 15) and sex (male/female) were the between-subjects factors, and channel (face/body), dimension (positivity/dominance) and year, the within-subjects factors (repeated measures). The video primacy scores examined in the above analysis were collapsed across degree of discrepancy and the content filtering vs. randomized splicing factors (a separate analysis examined effects of degree of discrepancy, and the difference between content filtering and randomized splicing was not of interest in the context of the present study). The accuracy scores were based only on consistent items and also collapsed across the content filtering/randomized splicing factor. For both video primacy and accuracy scores, main effects and/or interactions involving age where further examined in linear contrasts. For main effects, the contrast weights assigned to the seven successive age levels were -3, -2, -1, 0, +1, +2, and +3.

Results

Prior to presenting the analysis of consistent and discrepant decoding ability it should be noted again that the longitudinal aspects of the present study were designed to permit replication of the cross-sectional aspects of the Zuckerman et al., (1980) findings of the effect of age on the decoding accuracy of consistent nonverbal cues. It should also be noted that the overall mean accuracy score ($\bar{x}$ = 3.14) differed significantly from zero ($t(71) = 26.83$, $p < .001$, $d = 6.36$),

indicating that decoding accuracy was better than chance.[3]

Accuracy at Decoding Consistent and Discrepant Affects

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Mean decoding accuracy scores for consistent affect are presented in the top half of Table 1. It can be seen that accuracy at decoding consistent nonverbal cues increased with age, linear contrast for age, F (1,71) = 5.37, $p < .05$, $d = .55$. In addition, dominance cues (linear contrast for age, F (1,71) = 11.08, $p < .01$, $d = .79$), and facial cues (linear contrast for age, F (1,71) = 4.62, $p < .05$, $d = .51$) were particularly more accurately decoded by older children. The main effect of year and the age x year interaction for consistency accuracy were not significant.

Mean decoding accuracy scores for discrepant affect are presented in the bottom half of Table 1. It can be seen that discrepancy affect accuracy increased with age, (linear contrast for age,(F (1,71) = 24.79, $p < .001$, $d = 1.18$). Although both facial and body accuracy for discrepant cues increased with age, it was interesting to note that this effect was substantially greater for body than for face accuracy (F (1,71) = 6.14, $p < .05$, $d = .59$, for face and F (1,71) = 27.72, $p < .001$, $d = 1.25$, for body).

As predicted, the linear contrast of age x year interaction for discrepancy accuracy was significant (F (1,71) = 4.72, $p < .05$, $d = .52$). This interaction shows that relative to younger children, older children benefited more from the effects of retesting in terms of accuracy at

decoding discrepant cues and is consistent with the DePaulo and Rosenthal results (1978, 1979c). The main effect of year for discrepancy accuracy was not significant. Overall, it appears that abilities to decode different affective dimensions and channels do not develop at the same rate. Further, although older children perform better than younger children at most nonverbal decoding tasks, the advantages of age are especially great for the decoding of discrepant cues.

Video Primacy and Leakage Decoding Strategy

Video primacy scores for the seven age levels and for the two years are presented in Table 2. Consistent with previous findings (Zuckerman

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et al., (1980), analyses of the video primacy scores showed no overall main effects for age. However, the linear contrast of age x year interaction for video primacy did point in the predicted direction (F (1,71) = 2.76, d = .39; t = 1.66, p = .05, one-tailed). This trend shows that relative to younger children, older children displayed less video primacy after retesting. Stated differently, when the nonverbal channels were discrepant, older relative to younger children displayed a tendency to rely more heavily on a less controllable channel (i.e., tone) to gain information about the encoder's true affect, after having been retested.

A separate analysis of variance compared video primacy for sex and year effects. The analysis of variance included channel and year as within-subjects factors and sex as the between-subjects factor.

Both males and females showed a decrease in video primacy after retesting (main effect of year: F (1,76) = 4.64, $p < .05$, $d = .49$) suggesting once more that after retesting, children rely relatively more on audio cues (as opposed to video cues) to determine the encoder's true affect. It appears that with practice children learn to "trust" less controllable channels (i.e., audio) in determining true encoder affects when nonverbal cues are discrepant, and this seems to be especially true of older relative to younger children. This pattern of results is further supported by the findings that all children showed significantly greater audio accuracy, the least controllable channel, after retesting (F (1,76) = 9.83, $p = .003$, $d = .72$), while they did not show significantly greater video accuracy (F (1,76) = .362, $d = .14$), after retesting.

Finally, consistent with the Zuckerman et al., (1980) findings, as the scenes became more and more discrepant ("leakier"), (i.e., in the moderately discrepant scenes, the audio and video components differed on one affective dimension ("off by one"), whereas in the extremely discrepant scenes they differed on both affective dimensions ("off by two")), older children relative to younger children, showed less video primacy (linear contrast for age, F (1,71) = 4.18, $p < .05$, $d = .48$). The mean scores for this leakage decoding strategy for the seven age levels are presented in Table 3.

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Insert Table 3 about here
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These results support the suggestion (DePaulo & Rosenthal, 1979a) that the tendency to show less video primacy for more discrepant cues, at least to some degree, is a developmental phenomenon. The linear contrast of the age x year interaction as well as the main effect for year for the leakage decoding strategy were not significant.[4]

Discussion

This study examined longitudinal and cross-sectional age changes in accuracy and style of decoding nonverbal cues. Three specific questions were examined: the accuracy with which subjects decoded consistent and discrepant affects from face or body and tone, the extent to which subjects were more influenced by video than by audio cues (video primacy), and the extent to which this video primacy was influenced by the degree of discrepancy between audio and video nonverbal cues (leakage).

Most likely, the overall level of both accuracy and video primacy were partially a function of the stimulus materials that were used in the Nonverbal Discrepancy Test. It is possible that a different set of materials would produce a different level of accuracy and a different magnitude of video primacy. It is less likely, however, that a different set of materials would produce markedly different developmental changes. It is important, therefore, to focus not on the overall level of accuracy, but on the question of how accuracy changed as a function of age, retesting, channel, and affective dimension. Similarly, the fact that subjects were more influenced by video than by audio cues is of much less interest than the fact that this video primacy changed as a function of other factors.

Consistent with the results of previous work (DePaulo & Rosenthal, 1978; Rosenthal et al., 1979; Zuckerman et al., 1980), increases in age, defined both longitudinally and cross-sectionally, were associated with increases in ability to decode nonverbal cues. Further, the advantages of age were especially great for the decoding of discrepant nonverbal cues which involve interpreting complicated mixed channel messages. Retesting seems to be associated with greater gains in decoding discrepant nonverbal cues for older relative to younger children.

Another question of interest concerned longitudinal and cross-sectional changes in differential attentiveness to or reliance on various channels of nonverbal cues. It was found that there was a tendency for all children, especially older subjects, to show less video primacy after retesting. These results suggest that with practice, and as nonverbal cues become discrepant, children display a tendency to rely more heavily on less controllable channels (i.e., tone) to gain information about an encoder's true affects. This effect of practice is greater for older than for younger children.

Finally, the present findings replicated cross-sectionally the results of the Zuckerman et al. (1980) study showing that relative to younger children, older children treat extremely discrepant messages with some caution. As previously stated, DePaulo et al. (1978) suggested that people perceive extremely discrepant messages as indicative of deception and therefore, may attend relatively more to the audio cues. Older children, it appears, have developed some degree of distrust toward facial expressions when the expressions are accompanied by discrepant vocal cues, and retesting does not seem to affect this

result differentially for the older or the younger children.

Our purpose has been to help foster the investigation of the processes underlying increases in nonverbal skill and changes in nonverbal style. The results suggest that age, defined both longitudinally and cross-sectionally, is associated with the growth of many nonverbal skills. Further, this increase is moderated by the type and amount of the information presented, by discrepancies in the information presented, and by the effects of retesting. It should be noted, as DePaulo and Rosenthal (1978) have suggested, that the relative advantage of older children in processing certain nonverbal cues may be a function not only of a larger processing capacity, but also a function of such factors as effort, distractability, and/or stamina. It remains for future research to examine, through experimentally controlled conditions, the effects of retesting on intraindividual change in the ability to decode and encode nonverbal cues. This line of research may shed light on the relationship between nonverbal learning and/or socialization processes and individuals' sensitivity to specific nonverbal channels.

Reference Notes

1. Blanck, P.D., Rosenthal, R., Snodgrass, S.E., DePaulo, B.M., & Zuckerman, M. Developmental changes in females' superiority at decoding nonverbal cues. Presentation at the meeting of the American Psychological Association Convention, Montreal, 1980.

2. Blanck, P.D., Johnson, R., Rosenthal, R., Snodgrass, S.E., & DePaulo, B.M. Nonverbal styles and skills in best-friend relationships. Manuscript submitted for review, 1980.

3. Blanck, P.D. & Rosenthal, R. Masculinity, femininity, and the nonverbal decoding skill of children. Manuscript submitted for review, 1980.

4. Green, C.R. & Santostefano, S. Nonverbal sensitivity and cognitive control development in children. Paper presented at the meeting of the Eastern Psychological Association Convention, Hartford, 1980.

References

Baltes, P. B., Reese, H. W., & Nesselroade, J. R. Life-span developmental psychology: Introduction to research methods. Monterey, CA.: Brooks/Cole, 1977.

Blanck, P. D., Zuckerman, M., DePaulo, B. M., & Rosenthal, R. Sibling resemblances in nonverbal skill and style. Journal of Nonverbal Behavior, 1980, 4, in press.

Buck, R. Nonverbal communication of affect in children. Journal of Personality and Social Psychology, 1975, 31, 644-653.

Bugental, D. E., Kaswan, J. W., Love, L. R., & Fox, M. N. Child versus adult perception of evaluative messages in verbal, vocal, and visual channels. Developmental Psychology, 1970, 2, 367-375.

Case, R. Validation of a neo-Piagetian mental capacity construct. Journal of Experimental Child Psychology, 1972, 14, 287-302.

Cohen, J. Statistical power analysis for the behavioral sciences (Rev. ed.). New York: Academic Press, 1977.

DePaulo, B. M., & Rosenthal, R. Age changes in nonverbal decoding as a function of increasing amounts of information. Journal of Experimental Child Psychology, 1978, 26, 280-287.

DePaulo, B. M., & Rosenthal, R. Age changes in nonverbal decoding skills: Evidence for increasing differentiation. Merrill-Palmer Quarterly, 1979, 25, 145-150. (a)

DePaulo, B. M., & Rosenthal, R. Ambivalence, discrepancy, and deception in nonverbal communication. In R. Rosenthal (Ed.), Skill in nonverbal communication. Cambridge, Ma.: Oelgeschlager, Gunn, & Hain, 1979. (b).

DePaulo, B. M., & Rosenthal, R. The structure of nonverbal decoding skills. Journal of Personality, 1979, 47, 506-517. (c)

DePaulo, M. B., & Rosenthal, R. Measuring the development of nonverbal sensitivity. In C. E. Izard (Ed.), Measurement of Emotions in Infants and Children. New York: SSRC, in press.

DePaulo, B. M., Rosenthal, R., Eisenstat, R. A., Rogers, P. L., & Finkelstein, S. Decoding discrepant nonverbal cues. Journal of Personality and Social Psychology, 1978, 36, 313-323.

DePaulo, B. M., Rosenthal, R., Finkelstein, S., & Eisenstat, R. A. The developmental priority of the evaluative dimension in perceptions of nonverbal cues. Environmental Psychology and nonverbal Behavior, 1979, 3, 164-171.

Dimitrovsky, L. The ability to identify the emotional meaning of vocal expressions at successive age levels. In J. R. Davits (Ed.), The communication of emotional meaning. New York: McGraw-Hill, 1964.

Ekman, P., & Friesen, W. V. Nonverbal leakage and clues to deception. Psychiatry, 1969, 32, 88-106.

Gates, G. S. An experimental study of the growth of social perception. Journal of Educational Psychology, 1923, 14, 449-461.

Girgus, J. S., & Wolfe, J. Age changes in the ability to encode social cues. Developmental Psychology, 1975, 11, 118.

Izard, C. E. The face of emotion. New York: Appleton-Century-Crofts, 1971.

McCluskey, K. W., Albas, D. C., Niemi, R. R., Cuevas, C., & Ferrer, C. A. Cross-cultural differences in the perception of the emotional content of speech: A study of the development of sensitivity in Canadian and Mexican children. Developmental Psychology, 1975, 11, 551-555.

Pascual-Leone, J. A mathematical model for the transition rule in Piaget's developmental stages. Acta Psychologica, 1970, 32, 301-345.

Rogers, P. L., Scherer, K. R., & Rosenthal, R. Content-filtering human speech. Behavioral Research Methods and Instrumentation, 1971, 3, 16-18.

Rosenthal, R., Hall, J. A., DiMatteo, M. R., Rogers, P. L., & Archer, D. Sensitivity to nonverbal communication: The PONS Test. Baltimore: The Johns Hopkins University Press, 1979.

Scherer, K. R., Randomized-splicing: A note on a simple technique for masking speech content. Journal of Experimental Research in Personlity, 1971, 5, 155-159.

Zuckerman, M., Blanck, P. D., DePaulo, B. M., & Rosenthal, R. Developmental changes in ding discrepant and nondiscrepant nonverbal cues. Developmental Psychology, 1980, 3, 220-228.

Zuckerman, M., Przewuzman, S. J. Decoding and encoding facial expressions in pre-school-age children. Environmental Psychology and Nonverbal Behavior, 1979, 3, 147-163.

Footnotes

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[1] All subjects were taken from a larger sample at the summer camp (121 males and 129 females) who had participated in research in 1978 (Zuckerman et al., 1980); the latter study focused on developmental changes in decoding nonverbal cues employing only a cross-sectional design.

[2] In the basic standardization data of the PONS test, accuracy of face, body, content filtered voice and randomized spliced voice were all substantially greater than chance (Rosenthal et al., 1979).

[3] The $\underline{d}$ is defined as an estimate of the effect size, expressed in standard deviation units (Cohen, 1977), defined conceptually as $(M_1 - M_2)/\sigma$ and computed as $2\sqrt{\underline{F}}/\sqrt{\underline{df}}$ in this paper. Cohen considers a $\underline{d}$ of 0.20 to be a small effect, 0.50 a medium effect, and 0.80 a large effect.

[4] It should be noted that only one of the major dependent measures yielded significant sex differences, females were more accurate at decoding dominance ($\underline{F}$ (1,76) = 5.76, $\underline{p}$ = .019, $\underline{d}$ = .55). Finally, two empty cells in the age x year x sex larger analysis did not permit us to employ all these variables in the same analysis of variance. Hence, we computed age x year and sex x year ANOVA's separately.

Table 1

Mean Decoding Accuracy for Seven Age Levels

		Age Level							
	(N)	9 (2)	10 (16)	11 (21)	12 (21)	13 (12)	14 (3)	15 (3)	Mean
Consistency Accuracy	1978	0.98	2.78	3.17	3.45	3.23	3.38	3.28	2.90
	1979	2.81	2.75	3.15	3.87	3.90	3.83	3.32	3.38
	mean	1.90	2.76	3.16	3.66	3.57	3.60	3.30	3.14
	difference	+1.83	-0.03	-0.02	+0.42	+0.67	+0.45	+0.04	.48
Discrepancy Accuracy	1978	-0.88	0.92	0.05	0.43	1.06	1.47	0.92	.57
	1979	-1.18	0.75	0.20	1.41	1.52	2.78	3.08	1.22
	mean	-1.03	0.84	0.13	0.92	1.29	2.12	2.00	.90
	difference	-0.30	-0.17	+0.15	+0.98	+0.46	+1.31	+2.16	.66

Note: Higher scores indicate greater decoding accuracy.

Table 2

Mean Video Primacy Scores for the Seven Age Levels

	Age Level							
(N)	9 (2)	10 (16)	11 (21)	12 (21)	13 (12)	14 (3)	15 (3)	Mean
1978	.575	.837	.847	.823	.917	.843	1.173	.86
1979	1.20	.636	.567	.744	.602	.667	.833	.75
Mean	.887	.737	.707	.783	.759	.755	1.003	.80
Difference	+.625	-.201	-.280	-.079	-.315	-.176	-.340	-.11

Note: Higher scores indicate greater video primacy.

Table 3

Mean Leakage Decoding Strategy Scores for the Seven Age Levels

	Age Level							
(N)	9 (2)	10 (16)	11 (21)	12 (21)	13 (12)	14 (3)	15 (3)	Mean
1978	-.280	-.569	-.059	.515	.359	.093	-.200	-.02
1979	-.935	-.076	.161	.144	-.133	.697	.820	.10
Mean	-.607	-.322	.051	.330	.113	.395	.310	.04
Difference	-.655	+.493	.220	-.371	-.492	+.604	+1.02	.12

Note: Higher scores indicate greater nonverbal leakage decoding strategy.